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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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Ex parte JOHN J. MACK and ROBERT CLAY PATTERSON

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Appeal 2020-000995
Application[1] 15/399,130
Technology Center 3600

_____

Before ANTON FETTING, AMEE A. SHAH, and
RACHEL H. TOWNSEND, *Administrative Patent Judges*.

TOWNSEND, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) involving claims to an assembly for pumping well fluid from a well, which have been rejected as obvious. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm in part.

STATEMENT OF THE CASE

Appellant's Specification states that "[e]lectrical submersible well pump assemblies (ESP) are often used to pump hydrocarbon producing wells" and they are "installed in a variety of manners using coiled tubing

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Baker Hughes, a GE Company, LLC. (Appeal Br. 1.)

deployed from a reel." (Spec. 2.) The Specification notes that "[a] packer in the production tubing will isolate the intake of the ESP from the discharge." (*Id.*) The Specification states that a "disadvantage of a coiled tubing installation" is where thermal growth of the production tubing occurs, which "could possibly push the packer down in the production tubing, causing the packer to lose sealing engagement with the production tubing." (*Id.*) Appellant's invention is concerned with a pump assembly that "is movable relative to the packer bore in response to thermal growth" but still "seals in the packer bore." (*Id.* at 1.)

Claims 1–3, 5–7, 9, 21–23, and 25 are on appeal. Claim 1 is representative and reads as follows:

> 1. An assembly for pumping well fluid from a well, comprising:
>
> a string of coiled tubing for lowering into a conduit of the well;
>
> an electrical submersible pump ("ESP") secured to the string of coiled tubing, the ESP having a longitudinal axis, a pump and a motor;
>
> a seal member having at least one annular seal and connected into the ESP concentric with the axis of the ESP;
>
> a packer carried by the ESP and configured to set in the conduit at a selected depth, the packer having a body with a bore through which the seal member extends with the seal in sealing engagement with the bore;
>
> shear means for initially retaining the body of the packer in a fixed axial position with the seal member as the ESP is lowered on the string of coiled tubing into the conduit and while the packer is being set, and after the packer has set, for enabling the seal member to move downward in the bore of the body of the packer in response to a downward axial force on the seal member due to thermal growth of the string of coiled tubing relative to conduit, the shear means comprising a shear

> pin extending laterally from the body of the packer into the seal member.

(Appeal Br. 23.)

The prior art relied upon by the Examiner is:

Name	Reference	Date
Cornette et al.	US 5,348,092	Sept. 20, 1994
Mack et al.	US 8,538,632 B2	Sept. 10, 2013
Stewart	US 3,792,732	Feb. 19, 1974
Duell et al.	US 5,261,492	Nov. 16, 1993
Badalamenti et al.	US 2008/0017376 A1	Jan 24, 2008

The following grounds of rejection by the Examiner are before us on review:

Claim 1 under 35 U.S.C. § 103(a) as unpatentable over Cornette and Mack.

Claims 2, 3, and 7 under 35 U.S.C. § 103(a) as unpatentable over Cornette, Mack, and Stewart.

Claims 5, 6, 8, 21, and 25 under 35 U.S.C. § 103(a) as unpatentable over Cornette, Mack, and Duell.[2]

Claim 9 under 35 U.S.C. § 103(a) as unpatentable over Cornette, Mack, and Badalamenti.

Claims 22 and 23 under 35 U.S.C. § 103(a) as unpatentable over Cornette, Mack, Duell, and Stewart.

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[2] The Examiner's statement of the rejection in the Final Action did not include claim 21. (Final Action 12.) However, we determine that this was an inadvertent error because the analysis by the Examiner specifically addresses claim 21. (*Id.* at 17.)

DISCUSSION

Claim 1

The Examiner finds that Cornette teaches an assembly for pumping well fluid from a well that includes a seal member, a packer, and a shear means. (Final Action 5–6.) The Examiner recognizes that Cornette "is silent" regarding a string of coiled tubing, an ESP, and a connection of the seal member into the ESP concentric with the axis of the ESP. (*Id.* at 6.)

The Examiner finds that Mack teaches a string of coiled tubing for lowering an ESP into a conduit of a well, where the ESP also has a seal member connected in the ESP concentric with the ESP axis. (*Id.* at 6–7.)

The Examiner notes that the combination of gravel packing/sand screen assemblies in production wells with an ESP is known in the art as indicated in US 2016/0177684 A1 (Parks), US 2009/0008088 A1 (Shultz), and US 2007/0144746 A1 (Jonas). (Ans. 7.) In addition the Examiner finds that "the consideration of artificial lift techniques e.g. the use of an ESP, packer deployment and use, and sand control techniques (such as gravel packing and sand screens) are routine, major considerations when designing a well completions operation." (*Id.* at 6 (citing Bellarby[3] 11–13).) The Examiner notes that "[i]n designing a well completions, a well completions engineer would contemplate these completions design considerations." (*Id.* at 4.)

The Examiner concludes that it would have been obvious to one of ordinary skill in the art to have modified the production well of Cornette by

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[3] Jonathan Bellarby, *Well Completion Design*, 56 Developments in Petroleum Science (Elsevier 2009).

adding an ESP as disclosed in Mack so as to enhance the fluids produced from the well. (Final Action 7.) Moreover, the Examiner concludes that using coiled tubing as taught in Mack in substitution for the rigid tubing of Cornette would have been obvious as a matter of simple substitution of the tubing used for lowering that would obtain predictable results in the production well of Cornette. (*Id.*)

We agree with the Examiner's conclusion of obviousness.

A. Analogous Art

Appellant first argues that Cornette is not analogous art to the claimed invention. (Appeal Br. 12–14; Reply Br. 1–2.) We do not find that argument persuasive for the reasons that follow. "In order to rely on a reference as a basis for rejection of the applicant's invention, the reference must either be in the field of the applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." *In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992). We note that if the art meets *either one* of these criteria, it is considered analogous.

In the Appeal Brief, Appellant argues only that "Cornette is not reasonably pertinent to the particular problem of thermal growth causing an ESP coiled tubing string to lengthen enough to result in seal leakage." (Appeal Br. 13.) Appellant does not address whether or not Cornette is in the same field of invention until the Examiner points out that they were in the Answer. The Examiner explains that both Cornette and the claimed invention are "related to the apparatuses associated with deployment of packer systems in a well concurrent with well production equipment all of which are a part of and consideration for well completion design." (Ans. 4.) Even more specifically, the Examiner explains that, like the claimed

invention, Cornette is concerned with "the deployment and setting of . . . well completion systems." (*Id.* at 5.) Appellant's response is the following assertion:

> Although both ESP installations and auger sand screen installations are well completions, they are not in the same field of endeavor because an inventor of an ESP coiled tubing installation would not have been motivated to consider Cornette. The field of endeavors are not the same.

(Reply Br. 1.) Not only do we find Appellant's argument to be tardy, given that it is well-known that prior art is analogous when either criteria is met, *Ex parte Borden*, 93 USPQ2d 1473, 1474 (BPAI 2010) (informative) ("the reply brief [is not] an opportunity to make arguments that could have been made in the principal brief on appeal to rebut the Examiner's rejections, but were not."), we also find it lacking in evidentiary support sufficient to establish this factual matter. "Attorneys' argument is no substitute for evidence." *Johnston v. IVAC Corp.*, 885 F.2d 1574, 1581 (Fed. Cir. 1989).

We agree with the Examiner that both the claimed invention and Cornette are concerned with the deployment and setting of well bore equipment including a packer. Regarding the placement and setting of the packer in the well, Appellant explains with respect to the claimed invention that "[t]hermal growth lengthening of the coiled tubing could cause the external seal on the packer to slip downward." (Appeal Br. 11.) Cornette explains that reciprocation of the tubing string through the packer on installation of the sand control screen causes "the packing or seal rings on the tubing string sub which engages the packer seal bore [to] invariably move[] into and out of the bore" which breaks the fluid tight seal between spaced apart zones. (Cornette 1:29–46.) The shear pins of Cornette allow for the packer to be set and then to prevent its movement when an axial force

acts on the deployment tubing to finish installation of the sand screen. (*Id.* 5:35–49.)

The Examiner provides three references that demonstrate ESP installation and sand control component installation are not so independent that they would not be considered together in well completion design. (*See, e.g.*, Parks ¶¶ 17–21 and Figure 1 (noting the exemplary tubing string includes a tool stack for managing production where the production string includes an ESP assembly and further below it there is a production zone that "typically" includes sand screens, where the ESP assembly pumps the production fluid to the surface); Jonas ¶¶ 25–27 (describing a system enabling deployment of a lower assembly that includes a sand screen in a well bore and subsequent deployment of an upper assembly and noting that these assemblies can include packers and ESPs or other lift valves); Schultz ¶ 23 (describing a well bore completed for production that includes sand screens, packers "and, in some instances, includes a fluid lift system (e.g., electric submersible pump. . .) for producing resources of the subterranean formation to the surface.").)

Furthermore, the Examiner provides yet another reference, Bellarby, that indicates that in designing a well completion, the well completion engineer contemplates topics such as lift, tubing isolation, and sand control requirements. (Bellarby 11–13.) Thus, the attorney argument alone asserting that an inventor of an ESP coiled tubing installation would not have been motivated to consider Cornette is not persuasive.

B. Combination of Mack and Cornette renders the claimed apparatus obvious

Appellant's argument that combining Mack with Cornette would be unworkable (Appeal Br. 14–17; Reply Br. 6–7) is also unpersuasive.

Appellant contends that "[t]aking away the auger type sand screen of Cornette would destroy the teachings of Cornette." (Appeal Br. 15.) The Examiner's rejection does not suggest taking away the sand screen, but rather, adding the ESP pump to a well completion that also includes a sand screen. (*See, e.g.*, Ans. 6.) And, as discussed above, such combinations are well known in the art. (*See* Parks ¶¶ 17–21; Jonas ¶¶ 25–27; Schultz ¶ 23.) Consequently, we do not find Appellant's argument as to an absence of suggestion of how the combination could be accomplished (Appeal Br. 16) to be compelling of Examiner error. Nor is Appellant's argument that a power cable connected to the motor of Mack would twist and part if combining Mack with Cornette. (*Id.*)

First,

> [t]here is a distinction between trying to physically combine the two separate apparatus disclosed in two prior art references on the one hand, and on the other hand trying to learn enough from the disclosures of the two references to render obvious the claims in suit. . . . Claims may be obvious in view of a combination of references, even if the features of one reference cannot be substituted physically into the structure of the other reference.

Orthopedic Equip. Co. v. United States, 702 F.2d 1005, 1013 (Fed. Cir. 1983). As just discussed, combining both structures together into a well completion is known. As for Appellant's power cord argument, we agree with the Examiner's implication that one of ordinary skill in the art would have been able to determine the placement of a power cable to be used with the ESP in order to achieve a working ESP. (Ans. 7.) Indeed, Parks teaches one such method (Parks ¶ 21), as does Jonas (Jonas ¶¶ 26–27).

Appellant also argues that "the combination of Cornette with Mack would require Cornette's tubing string 28 to comprise coiled tubing . . .

[which] is installed from a reel with an injector, leaving no way for it to be rotated to install the auger type sand screen." (Reply Br. 7.) We do not find this argument persuasive of non-obviousness. Appellant's claimed invention is directed to an apparatus, and not the method of putting the elements thereof together. "[A]pparatus claims cover what a device is." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1468 (Fed. Cir. 1990). As discussed, one of ordinary skill in the art would have known how to install both a sand screen and an ESP in a well completion, where the ESP is installed with a coiled tubing and a different string is used to install the sand screen. As Jonas teaches, a lower complete stage can be positioned, the deployment equipment retrieved, and the next complete stage can then be moved down toward engagement with the lower completion. (Jonas ¶ 29.) Such a procedure would avoid Appellant's concern about the difficulty of using a coiled tubing to install the auger type sand screen of Cornette.

Finally, that neither Cornette nor Mack mentions thermal growth or dealing with problems thereof and that Mack is not concerned with downward force (Appeal Br. 16) do not convince us the Examiner's rejection is in error. Cornette provides a reason to include a shear means in setting a packer where downward forces within the bore might dislodge the packer seal. And as the Examiner indicates, "[A]ppellant has not identified why such identical structure would be unable to perform the intended function of shearing in response to downward axial force due to the known, characteristic, and naturally occurring thermal expansion phenomena."

(Ans. 10.[4]) Furthermore, as the Examiner notes in the Answer, and Appellant does not contest, jarring and downhole temperature-induced tool-length expansion are known forces that can occur in well completions, and shear pins have been used in conjunction with both, as a means to prevent premature release of the packer. (Ans. 8–9 (citing Burgos[5] ¶ 8).)

In light of the foregoing, we affirm the Examiner's rejection of claim 1 as being obvious over Cornette and Mack.

Claims 2, 3, and 7

For each of these claims, the Examiner first relies on Cornette as teaching an annular seal (i.e., the contact of 28 with seal 46), but notes that Cornette is silent on the seal comprising a plurality of annular seal rings mounted around the tubular member. (Final Action 8, 9, 11.) The Examiner finds that it would have been obvious to instead use Mack's multiple seal rings 32 mounted on the tubular member, which would be "combining prior art elements according to known methods to yield predictable results." (*Id.*)

Regarding claim 2, the Examiner then relies on Stewart for the obviousness of the limitation requiring seal rings extending "over an axial length on the tubular member that is greater than an axial length of the bore of the packer." (*Id.* at 9). The Examiner concludes that it would have been

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[4] In the Reply Brief, Appellant belatedly presents arguments for the first time regarding deficiency of the Examiner's rejection as to the identity of the claimed seal member and the prior art. (Reply Br. 8) We do not consider this new argument, which could have been presented in the Appeal Brief, given the substance of the Examiner's rejection did not change between the Final Action and the Answer. *Ex parte Borden*, 93 USPQ2d at 1474.

[5] US 2012/0160523 A1, published June 28, 2012

obvious to have modified Cornette as modified by Mack with the seal ring arrangement being axially larger than the packer bore,

> for the purpose of having "seal assemblies great enough to extend from the uppermost packer through the lowermost packer" or multiple packers (Stewart Column 2, lines 19-20) and to provide greater confidence in full engagement with a packer "for preventing the well fluids from flowing in an uncontrolled manner from the producing formation through the casing or tubing to the surface" (Stewart Column 2, lines 60-63).

(*Id.*)

As for claims 3 and 7, the Examiner relies on Stewart for the obviousness of the claim requirement that "prior to the shear pin being sheared, at least one of the seal rings will be located above the bore of the packer," and for claim 7's requirement that "after the shear pin has sheared, at least one of the seal rings will be located below the bore of the packer." (*Id.* at 10–12.) The Examiner asserts that "Stewart teaches prior to . . . the shear pin being sheared, at least one of the seal rings will be located above the bore of the packer" (*Id.* at 10) and contends that it would have been obvious to include this feature for the same reason it would have been obvious to have seal rings extending over an axial length on the tubular member that is greater than an axial length of the bore of the packer, i.e., having "'seal assemblies great enough to extend from the uppermost packer through the lowermost packer' or multiple packers (Stewart Column 2, lines 19-20) and to provide greater confidence in full engagement with a packer 'for preventing the well fluids from flowing in an uncontrolled manner from the producing formation through the casing or tubing to the surface' (Stewart Column 2, lines 60-63)." (*Id.*)

We disagree with the Examiner's conclusion of obviousness with respect to claim 2. In particular, Stewart seeks to provide for sealing off packer 1 and packer 2 that are spaced a distance apart from one another so as to seal off fluid flow into a damaged area of the production line. (*See, e.g.*, Stewart col. 2:33–3:15.) To do so, Stewart has a set of seal rings extending over an axial length of the tubular member that is greater than an axial length of the bore of the packer such that there is one seal that can reach the lower packer and still have a seal available to seal off the upper packer. (*See, e.g.*, *id.* Fig 1.) Having such an arrangement provides "a positive, quick and sure closure . . . for preventing the well fluids from flowing in an uncontrolled manner from the producing formation through the casing or tubing to the surface." (*Id.* at 2:60–63.)

Although we agree with the Examiner that Stewart is analogous art because it is in the same field of invention as the claimed invention, i.e., completions design of a well (Ans. 11), we agree with Appellant that the arrangement in Stewart would not have been considered by one of ordinary skill in the art to combine with the seal arrangement in Cornette as modified by Mack. (Appeal Br. 19.) The problem in Stewart of sealing off two spaced apart packers and thus having multiple spaced apart annular seal rings greater than an axial length of the bore of the packer on a string of tubing that can be lowered into the well bore to create a seal at each of the spaced apart packers and provide a closure in the well bore between the packers would have no relevance (1) to the sealing in the seal sub element 30 of Cornette where the multiple seal elements are provided in the sub itself to engage the tubing 28 and maintain a fluid tight seal while the tubing 28 is decoupled from the sub for reciprocation and rotary movement

to set the sand screen or (2) to the sealing in Mack in which seal rings at the lower end of a stinger are lowered into a receptacle of a reservoir control valve to create a fluid tight seal between the stinger, ESP, and valve so that the ESP can pull fluid through the stinger. We conclude that the Examiner's reason to combine lacks a sufficient rational underpinning. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.").

Regarding claims 3 and 7, we similarly agree with the Appellant that there would have been no reason to provide the tubular member of Cornette as modified by Mack so as to have at least one of the seal rings located above the bore of the packer prior to the shear pin shearing. First, of all Stewart does not teach anything about "prior to" a shear pin being sheared as Stewart does not teach shear pins at all. Second, the Examiner's reasoning of having the claimed arrangement to address sealing between multiple packers is again of no relevance to Cornette or Mack for the reasons discussed above. And, finally, the Examiner's reasoning does not even address why one of ordinary skill in the art would have a seal ring located above the bore of a packer prior to a shear pin shearing. Consequently, we do not affirm the Examiner's rejection of claims 2, 3, and 7 as being obvious from Cornette, Mack, and Stewart.

Claims 5, 6, 8, 21, and 25

The Examiner explains that Mack teaches a tubular assembly connected to the section end 26 of ESP 16 of Mack. (Final Action 12.) The Examiner relies on Duell for the obviousness of including an external flange

below the packer on the lower end of the intake member. (*See, e.g.*, *id.* at 13.) According to the Examiner, the flange in Duell is identified in Figure 1 as part 21 on the lower end of mandrel 4, which sits in the recess 16 during deployment of the packer, the outer diameter of the flange being greater than the inner surface 38 of the packer. (*Id.*) The Examiner concludes that it would have been obvious to one having ordinary skill in the art to have provided a flange on an inner mandrel to the packer assembly of Cornette as modified by Mack "for the purpose of allowing the packer and an inner tubular to be retained together while the assembly is being deployed." (*Id.*)

Appellant also relies on the arguments that Cornette is not analogous art to with respect to this rejection (Appeal Br. 12) and that the combination of Cornette and Mack would be unworkable (*id.* at 17), that we discussed above. We do not find the arguments persuasive for the reasons already addressed.

In addition, Appellant argues that Duell cannot be combined with Mack, which is "the only cited reference in the same field as the claimed invention" and which is "the only cited reference disclosing running an ESP along with a packer on coiled tubing." (*Id.* at 21; *see also* Reply Br. 7–8.) Appellant asserts that "[i]f Duell's flange 22 were to be placed on intake member 24 of Mack, the teachings of Mack would be destroyed, because the ESP and its intake member 24 could not be retrieved from packer 34." (Appeal Br. 21.)

We do not find Appellant's argument establishes error in the Examiner's rejection. In particular, we disagree with Appellant that Cornette is not analogous art as discussed above. Moreover, as we also explained above, the Examiner's combination is the addition of an ESP with

a seal member connected into the ESP attached to a string of coiled tubing to the completion design of Cornette that includes a packer and shear means for retaining the body of the packer in a fixed axial position along with a sand screen element. (*See also* Ans. 12 ("Mack is only incorporated to teach the presence of an ESP and an assembly deployed on coiled tubing in lieu of tubing (as opposed to some of the particulars of intended use and functionality, and accompanying structure, taught by Mack.")).)

"The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Considering the teachings of the references as a whole does not require wholesale incorporation of every feature of one prior art structure into another, but rather whether "a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention." *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1361 (Fed. Cir. 2007). Here, it is immaterial to whether the claimed invention would have been obvious whether or not the packer could be retrieved by the decoupling mechanism of Mack if the flange of Duell was provided on an inner mandrel with a corresponding recess in the packer described in Cornette. That is because the releasable extension into a reservoir is not necessary for the obviousness of including an ESP, as disclosed in Mack, into a completions design.

Thus, we affirm the Examiner's rejection of claims 5, 6, 8, 21, and 25 as being obvious from Cornette, Mack, and Duell.

Claims 22 and 23

Claims 22 and 23 have the same limitations regarding seal rings discussed above with respect to claims 2 and 3. The Examiner relies on Stewart to address these limitations. (*See* Final Action 23–24.) For the reasons already discussed above, we disagree with the Examiner's obviousness conclusion regarding the relevance of Stewart's teachings to the sealing described in Cornette and Mack. Thus, we do not affirm the Examiner's rejection of claims 22 and 23 as being obvious from Cornette, Mack, Duell, and Stewart.

Claim 9

Claim 9 has not been argued separately (Appeal Br. 11) and therefore falls with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1	103	Cornette, Mack	1	
2, 3, 7	103	Cornette, Mack, Stewart		2, 3, 7
5, 6, 8, 21, 25	103	Cornette, Mack, Stewart, Duell	5, 6, 8, 21, 25	
9	103	Cornette, Mack, Badalamenti	9	
22, 23	103	Cornette, Mack, Duell, Stewart		22, 23
Overall Outcome			1, 5, 6, 8, 9 21, 25	2, 3, 7, 22, 23

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED IN PART